National Aeronautics and Space Administration

Technology Demonstration Mission Program

The Bridge

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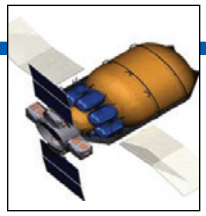
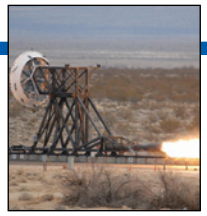
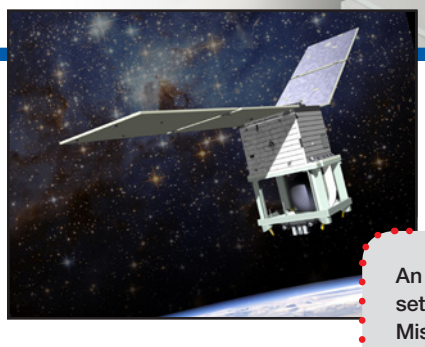
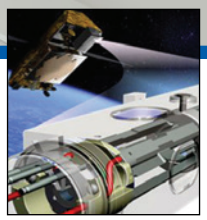



An artist's rendering of the Ball smallsat, set to carry the Green Propellant Infusion Mission to space for flight-testing in 2015. (Image: Ball Aerospace)

Green Propellant Infusion Mission Joins TDM Project Family

Late last summer, NASA selected Ball Aerospace & Technologies Corp. of Boulder, Colo., to lead its newest Technology Demonstration Mission project: the Green Propellant Infusion Mission.

With this award, NASA has expanded the scope of TDM to pursue environmentally friendly technologies. Mission researchers will deliver a cheaper, safer, more powerful alternative to the toxic, corrosive propellant hydrazine.

Read all about the newest TDM project here.

MEDLI On the 'EDGE'

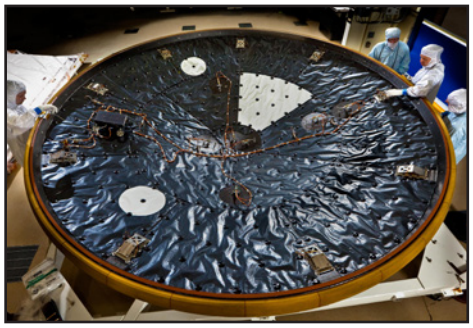
The Mars Science Laboratory Entry, Descent & Landing Instrumentation, or MEDLI, was the subject of a recent video feature by NASA EDGE, the agency's offbeat, informative video-podcast series.

NASA EDGE visited the MEDLI team at the Langley Research Center in late 2011, before the project was launched to space on the Mars Science Laboratory. NASA EDGE spoke with Michelle Munk, MEDLI deputy project manager, and Christopher Kuhl, the project's chief engineer.

The MEDLI engineering sensors made the journey to the Red Planet embedded in the vehicle's heatshield. Sophisticated sensors inside the shield measured temperatures and atmospheric pressure during entry and descent Aug. 6, as the vehicle descended to deliver its primary science payload: NASA's Curiosity rover.

Data from the sensors, now being studied by MEDLI researchers, will help NASA engineers design safer, more lightweight entry systems for future Mars missions — ones carrying human crews as well as robotic explorers.

Watch the complete NASA EDGE feature on MEDLI here.



Lockheed Martin engineers installed the Langley-built MEDLI on the back of the Mars Science Laboratory's heatshield. At almost 15 feet in diameter, the heatshield is the biggest ever built for a planetary mission. (Photo: Lockheed Martin)

NASA's Supersonic Decelerator Project 'On Track' for Success

NASA has completed three key milestones in its development of new atmospheric deceleration technologies to support exploration missions across the solar system.

The Low-Density Supersonic Decelerator project, which is developing technologies to use atmospheric drag to dramatically slow a vehicle as it penetrates the skies over worlds beyond our own, completed three successful rocket sled tests of the "SIAD-R," a Supersonic Inflatable Aerodynamic Decelerator, the first of three innovative deceleration systems now in development. The tests were conducted in October and November.

The project is led by NASA's Jet Propulsion Laboratory. The SIAD-R, built for NASA by ILC Dover of Frederica, Del., is a balloon-like pressure vessel with a diameter of nearly 20 feet, designed to inflate around a vehicle and slow its entry. The rocket sled tests of the SIAD-R were conducted at the Naval Air Warfare Center Weapons Division at China Lake, Calif.

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The team confirmed the inflatable device maintained integrity during the tests — with no rips or damage to the vessel detected. Researchers continue to review data recorded by sensors and instrumentation on the sled and the device, as well as test footage recorded by high-speed cameras placed along the entire sled track.

With this series of SIAD-R tests complete, the team now looks forward to testing the project's next piece of hardware — a massive parachute 110 feet in diameter, intended to further slow the entry vehicle. All three devices — including the SIAD-R's larger counterpart, the SIAD-E, with a diameter slightly larger than 26 feet — will be the largest of their kind ever flown at supersonic speeds.

The first SIAD-R and parachute supersonic flight test is scheduled for summer 2014. The devices could be used in Mars missions launching as early as 2018.

Read the complete story here.

NASA's Low-Density Supersonic Decelerator team gathers around the SIAD-R during rocket-sled testing at China Lake, Calif. (NASA/JPL)

TDM Celebrates Year Past at Annual Review

More than 60 NASA researchers, project managers and program leads gathered in Huntsville in October for the first Technology Demonstration Mission Program annual review. Project managers and principal investigators, program managers from the Level II Program Office at the Marshall Space Flight Center and representatives from NASA Headquarters in Washington — including TDM Program Executive Randy Lillard and Michael Gazarik, director of NASA's Space Technology Program in Washington — convened to review the program's accomplishments and plan for the future. (NASA/MSFC)

http://www.nasa.gov/mission_pages/tdm/main

Mind the Gap!

From the TDM Project Manager: Introductions All Around

By John McDougal

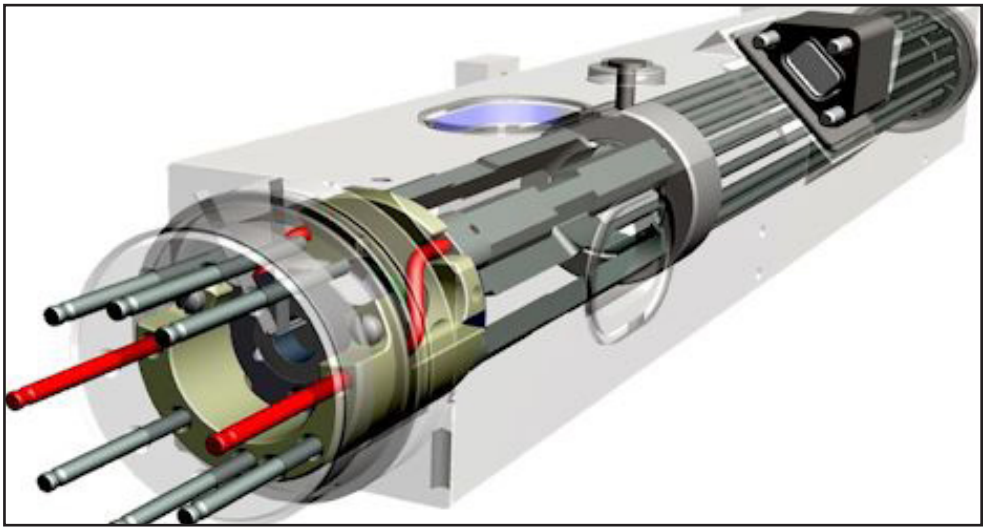
When you've spent a year focused on the series of critical tasks in front of you, it's amazing what you see when you've resolved them and can look around at the landscape once more, taking in the big picture.

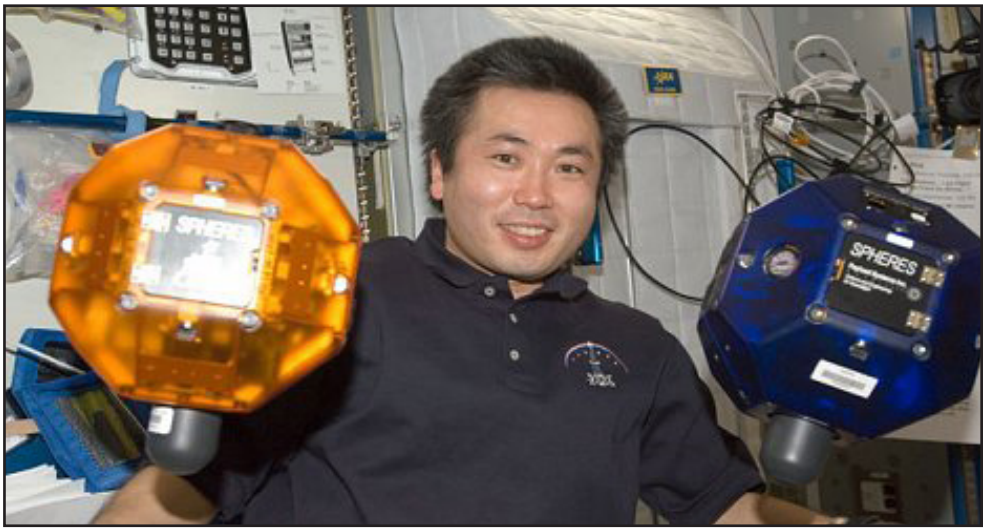
We formally kicked off the Technology Demonstration Mission Program in October 2011. Despite challenges, our team has made considerable strides in the year since to bridge the gap between scientific and engineering obstacles and the revolutionary technologies needed to overcome them.

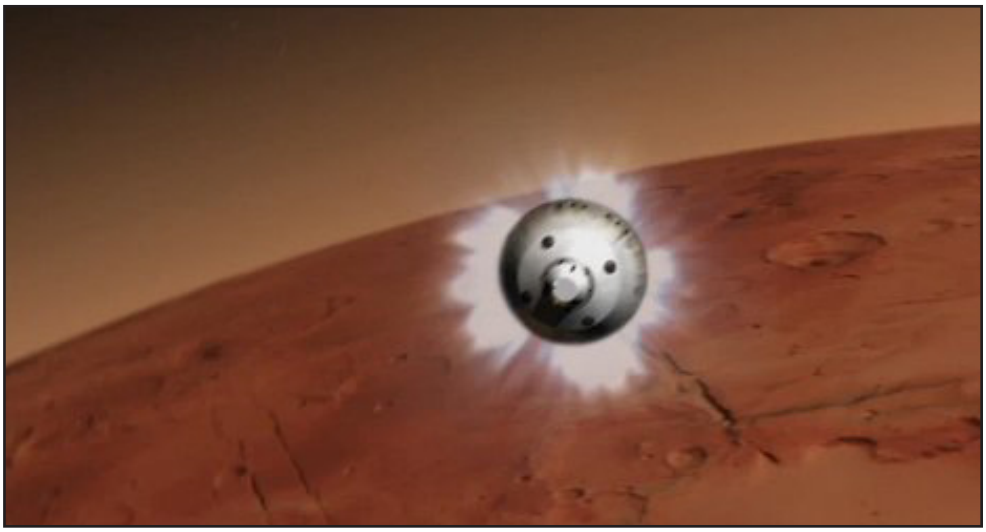
Our nine projects are off and running and I'm grateful for the way the entire program handled challenges to keep each project moving forward. From lasers transmitting data to space terminals, and robots hard at work on the International Space Station, to sophisticated sensor suites hurtling into the Mars atmosphere and all these other incredible activities, you have to admit — it's one of the coolest programs to be part of at NASA.

I look forward to the coming year, and the next string of successes this team will deliver.

McDougal manages the TDM Program Office at the Marshall Center.







TDM highlights in 2012: a detailed graphic rendering of the Deep Space Atomic Clock; a "Smart SPHERES" demonstration on the International Space Station; and the MEDLI sensor suite gets busy as the Mars Science Laboratory, seen here in an artist's rendering, begins its Red Planet entry and descent. (Images: NASA)

MISSE-Xperiments: Dust Mitigation

By Bob Granath

Editor's Note: Since 2001, NASA's Materials International Space Station Experiment (MISSE) series has tested thousands of samples, specimens and new technologies, demonstrating their durability and capability in the punishing space environment. "The Bridge" will regularly spotlight some of the revolutionary experiments scheduled for study as part of MISSE-X, the next in the series, when it is delivered to the International Space Station in 2016.

One of the challenges in exploring the moon or planets is dust kicked up by engines during landing or activity on these distant worlds. Scientists in the Electrostatics and Surface Physics Laboratory at the Kennedy Space Center are developing ways to mitigate this problem.

Electrodynamic dust shield, or EDS, technology is based on concepts originally developed by NASA as early as 1967 and later by the University of Tokyo. In 2003, NASA, in collaboration with the University of Arkansas at Little Rock, started development of the dust shield for dust particle removal from solar panels to be used on future missions to Mars.

Dr. Carlos Calle, lead scientist in Kennedy's Electrostatics and Surface Physics Lab, is developing instrumentation to deal with the problem of electrostatic dust phenomena during future planetary exploration missions.

"Our payload, called Electrodynamic Dust Shield for MISSE-X, will be mounted on an external station platform to verify the effects of the space environment," Calle said. "What we learn on the space station should allow us to be better prepared to mitigate dust problems the next time humans visit another planet."

Read the complete story here.

Granath, an Abacus Technology employee, supports the NASA Public Affairs Office at the Kennedy Space Center.

Electrodynamic dust shield devices are tested in a vacuum chamber during reduced gravity flights aboard a NASA aircraft. (NASA/KSC)

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